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Tõnurist, Piret; Pavlopoulos, D.

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Part-Time Wage-Gap in Germany: Evidence across the Wage Distribution

Piret Tõnurist and Dimitris Pavlopoulos

Abstract

This paper uses insights from labour-market segmentation theory to investigate the wage differences between part-time and full-time workers in Germany at different parts of the wage distribution. This is accomplished with the use of a quintile regression and panel data from the German Socio Economic Panel (1991-2012). To get more insight on the part-time wage differentials, we apply a counterfactual wage decomposition analysis. The results indicate the presence of a part-time wage penalty for involuntary part-time work at the low and middle parts of the wage distribution. In contrast, a wage premium for voluntary part time work emerges especially at the top of the distribution. Moreover, at the lower end of the wage distribution, part-time workers receive lower returns for their labour market characteristics, indicating the segmentation of the labour market. In contrast, at the top of the wage distribution, the part-time wage gap is fully explained by the difference in the characteristics of part-timers and full-timers.

Keywords: part-time employment, wage gap decomposition, labour market segmentation

JEL codes: J31, J42, C21

Corresponding author: Piret Tõnurist, Tallinn University of Technology, Faculty of Social Sciences: Department of Public Administration, Akadeemia tee 3-442, 12618, Tallinn, Estonia, tel. +372 581 39 879, email: piret.tonurist@gmail.com.

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1. Introduction

The rapid growth of part-time employment in Europe the last 30 years has come as a response to the need of employers for more flexibility but also, to a certain extent, to the need of workers for life-work balance reconciliation. At the positive side, part-time employment is associated with a large increase in female labour force participation. At the negative side, part-time employment may come at a cost as personal resources remain partly unutilized and investments in human capital are reduced for part-timers. This results in a well-known part-time wage penalty (Blank, 1990; Dekker, Muffels, & Stancanelli, 2000; Gornick & Jacobs, 1996; Manning & Petrongolo, 2008; OECD, 1999; Russo & Hassink, 2008).

The aforementioned considerations for part-time employment become more relevant for countries with rigid labour markets, such as Germany. In these countries, part-time employment, as a form of atypical employment, carries a more negative connotation and thus, a stigma for the worker. In the last decades, Germany has been on a gradual path to make its labour market more flexible (Hevenstone, 2010). The result of this process is that the incidence of part-time employment in Germany is among the highest within the countries of the Organisation for Economic Co-operation and Development (OECD). Specifically, in 2009, 8% of the German male workers and 38.1% of the female workers was employed part-time (OECD, 2010). Despite the legislative efforts to equalize the rights of part-time workers with full-time workers, for example women face a 6% wage penalty compared to their full-time colleagues (McGinnity & McManus, 2007).

The average wage penalty, however, ignores the fact that part-time work is very heterogeneous. This heterogeneity stems from the fact that part-time employment encompasses both ‘good’ and ‘bad’ jobs: skilled workers and professionals next to workers in low-wage and low-status jobs (Kahne, 1992). An approach that considers average effects treats equally a low-wage cleaner with a highly paid advisor that both work part time. This heterogeneity is only partly taken away when, as most studies do, controlling for human capital and job characteristics. Previous research has shown that, even within jobs and within groups of individuals with similar skill levels, part-time work differs considerably according to several characteristics such as the type of the employment contract, the number of working hours, the position in the workplace, the strength of the trade unions and the preferences of the employer (Barling & Gallagher, 1996; Jenkins, 2004; O'Reilly & Fagan, 1998; Walsh & Deery, 1999). These considerations are even more valid for Germany as, in the absence of a statutory minimum wage, there are sometimes different wage regulations for workers in the same occupation and with the same characteristics. The heterogeneity of part-time jobs and specifically the existence of many inferior part-time jobs has been established by previous research (Horst & Seifert, 2012).

Regardless of the exact source of the heterogeneity of part-time work, the result is that in a good-quality part-time job the worker is highly remunerated, while in a bad-quality part-time job, he receives a low wage. Therefore, the wage level can serve as a good proxy that encompasses the characteristics that describe the quality of the part-time job. Wahlberg (2008) offers some preliminary evidence for Sweden that that the part-time wage-gap differs across pay levels, while Hardoy and Schøne (2006) present some evidence for the strictly regulated labour market of Norway. Moreover, examining effects across the wage distribution have been recently applied to informal jobs (Bargain & Kwenda, 2014), public-and-private sector employment

(Melly, 2005; McGuinness & Bennett, 2007) and fixed term contracts (Martens et al., 2007).

The aim of this paper is to investigate the part-time wage-gap across the wage distribution in Germany. To distinguish between net wage differences that are attributed to part-time employment and wage differences that emerge due to the different composition of full-timers and part-timers, we employ a counterfactual decomposition on a quintile regression (Machado & Mata, 2005; Melly, 2007). Several robustness checks are applied including an estimator that applies quintile regression with panel data.

The paper is organised as follows: section 2 gives an overview of relevant theoretical considerations. Section 3 introduces the importance of the socio-economic context and proceeds to summarize the main facts in the German labour market and their effect on the wage levels of part-time workers. Section 4 outlines the data and the method used in this study. The results of the subsequent analysis with additional robustness tests are presented in section 5. The conclusions of the paper as well as the possible relevance of the main findings to future research and social policy are discussed in section 6.

2. Theoretical considerations

The part-time pay gap is typically explained by economic theoretical approaches such as the human capital theory and the theory on quasi-fixed costs and by sociological theories, such as preferences theory and the gender role model (Biddle & Thomas, 1966; Hakim, 2007; Tijdens, 2002). However, the standard considerations of these theories cannot account for differences in the part-time pay gap that emerge between different parts of the wage distribution. To explain these differences, we turn to first labour market segmentation theories and then we extend the argumentation of the theory of quasi-fixed costs to cover differences across the wage distribution.

Theories on labour market segmentation may play an important role in explaining the part-time wage-gap (Aaronson & French, 2004; Ermisch & Wright, 1992; Hardoy & Schøne, 2006; Jepsen, O'Dorchai, Plasman, & Rycx, 2005; Rodgers, 2004; Wolf, 2002). Here, we complement these theories with considerations from the theory on quasi-fixed costs to derive hypotheses on the variation of the part-time wage-gap across the wage distribution.

Segmentation theories

Labour market segmentation theories (see e.g. Doeringer & Piore, 1971; Edwards, 1979) suggest that the labour market is divided into two segments that differ in terms of job quality, remuneration and employment stability. In the primary segment, workers enjoy good working conditions, job or employment stability, high wages and good promotion opportunities. In contrast, in the secondary segment, precarious jobs with low security, low wages and scarce promotion opportunities are widespread.

Segmentation theories are relevant in explaining heterogeneity in part-time employment. Tilly (1991, 1992; 1996) and Walsh (1999) suggest the existence of a dualism in part-time employment. Specifically, they make a distinction between *retention* and *secondary* part-time jobs. Good or *retention* part-time jobs are created to keep a company's valued, mostly skilled employees, whose life circumstances prevent

them from working full-time. One could add here the high-skilled part-time jobs that cover specific and usually temporary needs of companies (i.e. advisors). Retention part-time jobs are located in the primary labour market and are occupied voluntarily by workers. Bad or *secondary* part-time jobs that outnumber the retention part-time jobs are found in the secondary segment of the labour market. One could argue that workers are employed involuntarily in these jobs. However, as the preferences theory or the role theory would suggest, this may not be the case. Many workers – mostly females – that are second breadwinners in the household, may value less the wage and the working conditions and accept such a part-time job. Therefore, part-time employment has a very different function at the two ends of the wage distribution. In low-wage jobs, part-time work serves as an indicator of the secondary segment of the labour market. In contrast, in high-paid jobs, part-time work is less of an indicator of the labour market segment.

In more detail, dual labour market theory maintains that part-time jobs are concentrated more in the secondary labour market making them more vulnerable (Hagen, 2002). The growth of part-time employment has occurred in the context of globalization, outsourcing and the subsequent change in employers' labour-use strategies, e.g. adjusting to business cycles (Buddelmeyer, 2008). In companies with a low technology base and high dependence on the fluctuation in market demand, a small number of 'core', full-time workers is needed to keep the company going, while production/service delivery could be managed by atypical employment (Lambert, 2008). Such part-time jobs are usually covered by population subgroups with poor labour market integration, such as female workers and immigrants. Workers from such groups typically have lower negotiation power and receive lower wages (Ermisch & Wright, 1992).

A different picture emerges in the primary sector of the labour market. In this sector, many firms, especially in the public sector, are responsive to the needs of workers for less working hours (Tijdens, 2002). These firms adjust their labour use strategies according to part-time work and thus, no part-time wage gap emerges. Moreover, in high-paid jobs in dynamic, innovative firms – e.g. ICT companies – that require specific skills flexible working hours may be encouraged (Boockmann & Hagen, 2001). Hiring high-paid experts for specific tasks on a part-time basis would be an opportunity for the firm to minimize the overall costs as there may not be enough work for a full-timer. In this case, the firm may offer even a higher hourly wage to the part-time expert than to his full-time colleague. Therefore, in such jobs there is no reason for a part-time wage-gap to exist.

Labour demand theory and quasi-fixed costs

The relationship between the working hours and the hourly wage is affected by the *quasi-fixed costs* that are related to paid employment and by the fluctuating levels of productivity during the working day. These costs are related to hiring, training, administrating, coordinating and monitoring workers, as well as to the 'start-up' effect and the 'fatigue effect' (Barzel, 1973; Gregory, 2010). If these costs are high, it becomes preferable for employers to hire people on full-time capacity and with a higher wage instead of relying on part-time workers (Montgomery, 1988).

Quasi-fixed costs are typically higher for high-skilled and high-paid jobs. Costs related to hiring and initial training are much higher for high-skilled – and therefore high-paid – jobs than for low-skilled jobs. Coordination costs are also higher

for managerial jobs than for low-paid jobs. Employing part-time managers would be too expensive for companies as this would require an increased investment in hiring and training as well as inefficiency due to the supervision of full-time workers by part-time managers. If such managers are indeed hired, companies may compensate for the high fixed costs by offering them a lower wage (Rosen, 1976).

With the face of *Janus*, the argument reverses when we focus on the other end of the wage distribution: the lower the associated quasi-fixed costs of employing workers, the more preferable it is to employ part-time workers if that can be achieved at a lower cost. The theory of quasi-fixed costs would suggest that low-paid jobs are mainly simple, unskilled jobs where hardly any fixed costs apply while high-paid jobs are skilled jobs with many related fixed costs. Thus, according to quasi-fixed costs, we expect the part-time wage-gap to be smaller at the lower end of the wage distribution. Consequently, we expect different effects of part-time employment on wages at the different parts of the wage distribution.

3. Socio-economic context and the German labour market

The upsurge of part-time employment has been connected to the growing needs for flexibility, especially in times of uncertainty (O'Reilly & Fagan, 1998). However, working-hours supply is also influenced by institutional factors: employment protection, tax incentives, availability of child care and elderly-care provision (Gash, 2008; Schmid, 2010).

Germany is an example of a corporatist welfare state in the typology of Esping-Andersen (1990) or a coordinated market economy (Hall & Soskice, 2001: 39) with cooperative capital-labour relations and bargained moderation in wage setting (Ebner, 2010). Already after the II World War the German labour market headed for the '*Normalarbeitsverhältnis*,' i.e. the standard employment relationship: full-time job with protection against dismissal, status protection and most importantly collective wage setting well above the subsistence level (for an overview of German employment model, see Eichhorst, 2011). The German labour market tightly links educational credentials with job requirements (Gangl, 2004; Gangl, Müller, & Raffe, 2003). Educational credentials and labour market experience account for a large part of the earnings progression over the life cycle (Trappe & Rosenfeld, 1998). The German labour market is a typical 'insiders' labour market, where 'core' workers in the primary segment enjoy a high level of job protection and higher wages, while their counterparts in the secondary segment are much less protected and much more exposed to atypical employment (Giesecke, 2009). Long-term and full-time employment relations are typical for the primary segment of the labour market, while flexible contracts and part-time employment are widespread in the secondary segment.

In the last 20 years, developments in the German labour market have strengthened some of the aforementioned characteristics. As employment protection remained high, employers turned to internal flexibility arrangements, with part-time work having a leading role (Keller & Seifert, 2005). Restrictions for atypical employment started to be lifted in the 1990s. Consequently, between 1992 and 2006, part-time work in West Germany grew over 80%, while full-time employment decreased by 15% (Klinger & Wolf, 2011). Furthermore, recent labour market reforms in Germany, such as the Hartz reforms and the creation of 'mini-jobs' in the

2000s, have been associated with the expansion of regular part-time work (Schmid & Modrack, 2008), but also with the sharp increase of part-time work in the unregulated and low-wage section of the labour market (Bosch & Kalina, 2008; for an overview of state reforms regarding low paid work see Caliendoa & Wrohlichb, 2010; Eichhorst, 2011; Palier & Thelen, 2010). Since the early 1990's, a wage-gap for part-timers emerged. In the mid-1990s, the median hourly earnings of part-time workers were only 83% of the full-time equivalent (OECD, 1999). Despite this rise, the part-time pay gap in Germany remains lower than in other countries. For instance, Manning & Petrongolo (2008) suggest that this gap in 25% in the UK, while McGinnity & McManus (2007) find a 6% gap in Germany.

The relatively low part-time wage gap in Germany may be explained by wage regulations and legislation about equal treatment of part-timers. However, the fact that collective bargaining does not cover workers universally in most sectors may actually explain why this part-time wage gap exists. More specifically, in Germany, there is no statutory minimum wage. Nevertheless, collective bargaining sets minimum pay arrangements for the covered firms (Bosch & Weinkopf, 2010). In addition, binding minimum wages are set in some economic branches and occupations, such as construction, electrical work, janitors, roofers and painters. Minimum pay regulation affects merely the wages of the low paid, while also equalizes the hourly compensation between the low-paid part-timers and full-timers. The result is that both the level of the wage of low-paid part-timers and the wage difference between low-paid part-timers and low-paid full-timers may vary within the same sector as some firms are covered by collective bargaining while others are not.

3.1. Hypotheses

The theoretical framework and specific characteristics of the German labour market suggest that the wage-gap between part-time and full-time workers varies between the different parts of the wage distribution and that this wage-gap cannot be fully explained by differences in socio-demographic or employment related characteristics between full-timers and part-timers (hypothesis 1). Contradicting hypotheses can be derived considering the direction of this variation. According to the dual labour market theory, the part-time wage-gap is larger at the lower tail of the wage distribution as low-wage part-timers work in firms or jobs where accumulation of human capital is not rewarded (hypothesis 2a). In contrast, theory on quasi-fixed costs suggests that the part-time wage-gap is higher at the top of the wage distribution where fixed employment costs are higher (hypothesis 2b).

4. Research method and data

4.1. Dataset and description of main variables

To explore the part-time wage penalty in Germany, the German Socio-Economic Panel (SOEP) is used (Wagner, Frick, & Schupp, 2007). To include also data from East-Germany, observations from the period 1991-2012 are analysed. Although there are differences between East- and West-Germany, this regional aspect is incorporated into the analysis to examine the developments in Germany after the reunification.

The sample is restricted to workers between 18 and 55 years old. In accordance with OECD, part-time employment is defined as working 30 hours a week or less. The self-employed and the apprentices are excluded from the sample. Individuals working less than 10 hours weekly are omitted to exclude occasional workers with very low attachment to the labour market. After these corrections, the average actual weekly working hours in our sample amount to 21.5 for part-timers and 42.9 for full-timers.

The dependent variable in our analysis is the natural logarithm of the gross hourly wage. The hourly wage is calculated using the last month's gross earnings from paid employment and the actual working time per week. For years prior to 2002, wages are transformed to euros. Wages are also adjusted with the Consumer Price Index. Extreme values (the upper 30% of the 99th percentile and lowest 70% of the 1st percentile) of the hourly wage are dropped. Our final database consists of 109,080 observations of which 89,513 (83.6%) refer to full-time workers and 19,567 (16.4%) to part-time workers.

Our list of control variables includes, gender, age, marital status, educational attainment, nationality, health status, the age of the youngest dependent child, firm size, occupation according to the 4-digit ISCO-88 classification, industrial sector, the type of the employment contract and dummies for East Germany, for having experienced an unemployment spell in the year prior to the survey and for having followed training in the year prior to the survey. Finally, we also include year dummies to control for the business cycle. Descriptive statistics of control variables in our sample are provided in table 1.

[Insert Table 1 here]

4.2. Method

Previous research as shown that the analysis of atypical employment can be sensitive to the estimation models (see, e.g. Mertens & McGinnity, 2005); especially, in the presence of differing quality of available jobs across the wage levels. Thus, to estimate the effect of part-time work across the wage distribution in Germany non-parametric quantile regression approach is used (Koenker & Basset, 1978; Koenker & D'Orey, 1987; Koenker & Hallock, 2001).[1] The regression model of the wage y_i for quintile θ can be expressed as:

$$Q_\theta(y_i|X_i) = \alpha(\theta) + X_i\beta_\theta, \quad \theta \in (0,1)$$

where the y_i is the log hourly wage of the person i, X_i represents the vector of covariates and a, β_θ are the coefficients to be estimated. X_i is perceived as a linear function of the covariates, while the model specifies the θ^{th}quantile of the conditional distribution of the log hourly wage. We obtain consistent standard errors by using pair-wise design-matrix bootstrap with 500 replications (see an overview of calculating the covariance matrixes M. Buchinsky, 1995; M. Buchinsky, 1998).

Quantile regression is not impervious to selectivity bias with respect to working part-time. However, the assumptions of the OLS regression concerning the normality of the error terms do not necessarily hold in quantile regression as normality and homoskedasticity should not be automatically assumed (Albrecht et al.,

[1] We also tested the sensitivity of our results by restricting the analysis to a single cross section but this did not change the main findings of this study. Results are available at request.

2009). Therefore, Heckman's (1979) classic model for selectivity correction is not applicable in quantile regression. To deal with the possible endogeneity problem of part time work, usually an instrumental variable approach is proposed. However, the use of instrumental variables, such as children, marital status, carries such strong assumptions that in reality it is no better than the assumption that it is supposed to replace (Manning & Petrongolo, 2008). Taking this into account, the way to address the issue is to approximate a fixed effects model in a longitudinal setting as these are supposed to approximate average treatment effects more closely (Hirsch, 2005). Using panel data is found to be a reasonable way to control for the time-constant and unobserved characteristics of working part time (Booth & Wood, 2008; Fernández-Kranz & Rodríguez-Planas, 2011; Hirsch, 2005; Russo & Hassink, 2008). Research utilising panel data for Germany is scarce (see, for references, Wolf, 2013). However, most existing quantile regression techniques for panel data divide the disturbance term into separate components and make a strong assumption, namely that the parameters themselves do not vary due to fixed effects (see below for more details). Thus, these methods violate the non-separable disturbance property that is usually the reason for applying quantile regression at the first place.

Controlling for unobserved heterogeneity in a quantile setting is not straightforward and the approaches that are used are not optimal. Probably, the simplest method to correct for unobserved heterogeneity in this setting is the two-step fixed-effects estimator that is proposed by Canay (2011). Similar methods are proposed by (Koenker, 2004) Graham et al. (2009), Galvao Jr. (2011), Lamarche (2010) and Ponomareva (2011), next to alternatives proposed by Powell (2009), Chernozhukov et al. (2013). The last however are at the moment computationally so demanding that for large datasets, with number of controls they become inoperable in practise. However, Canay's method is computationally less intensive. In the Canay's two-step estimator approach, the unobserved individual fixed effects u_i are estimated as part of the conditional mean of the dependent variable Υ_{it} as follows:

$$\hat{u}_i = \frac{\sum_{t=1}^{T}\left(\Upsilon_{it} - \dot{x}_{it}\hat{\beta}(\theta\mu)\right)}{T}$$

where $\hat{\beta}(\theta\mu)$ is $\sqrt{nT}$-consistent estimator of the former from the conditional means regression. The second step follows the standard quantile regression described above with a newly transformed dependent variable, where the estimated component is subtracted from the dependent variable $\widehat{\Upsilon}_{it} = \Upsilon_{it} - \hat{u}_i$.

The disadvantage of Canay's method is that it relies on a very strong assumption. Specifically, by modelling pure fixed effects as location shifts, it assumes that unobserved heterogeneity has the same effect at all quantiles. Thus, the additive fixed effect alters – by separating the total disturbance – the interpretation of the coefficient of interest: after the manipulation the effect of interest should only be interpreted as "relative to one's own fixed effects" (Smith, 2014).[2] For this reason, we use this method only as a sensitivity test.

To exemplify further the differences between part-time and full-time workers, we apply a wage decomposition similar to the Oaxaca-Blinder decomposition (Blinder, 1973; Oaxaca, 1973). The principle of this method is that the part-time wage gap is decomposed into a component that is due to the different composition of the

[2] Powell (2010a, 2010b) has developed a fixed-effects estimator that relaxes this restrictive assumption. However, the implementation is still at an experimental stage and it is not possible to apply it in this paper.

two groups and a component that is related to the return to the characteristics of the two groups. As, in a quantile regression, the vectors of the explanatory variables and the individual error terms make the wage estimates conditional to the specific quantile, the standard Oaxaca-Blinder decomposition cannot be applied. In recent years, Machado and Mata (2005) have proposed a decomposition procedure that incorporates bootstrap to quantile regression. This method is based in the probability integral transformation theory (Melly, 2005), which is used to estimate the wage density. Melly (2007) and Chernozhukov et al. (2009) proposed a modified procedure of Machado and Mata's (2005) decomposition by estimating a quantile regression for a selected number of quantiles of the log wage. This procedure yields essentially the same results as the approach proposed by Machado and Mata, while not relying solely on simulation-based estimation. According to this approach, the estimator of the θ^{th} unconditional quantile (from j $= 1, \ldots,$ J) can be expressed as follows:

$$q(X_i, \beta_\theta, \theta) = \inf\left\{ q : \frac{1}{N} \sum_{i=1}^{N} \sum_{j=1}^{J} (\theta_j - \theta_{j-1}) 1\left(x_i \beta_{\theta_j} \leq q\right) \geq \theta \right\}$$

where 1 is the indicator function.

Afterwards, a counterfactual distribution of the wage gap is performed by replacing the estimated parameters of the distribution of characteristics of full-time workers with those of part-time workers. This can be noted as follows:

$$\begin{aligned} q\left(X_i^p, \beta^t, \theta\right) - q\left(X_i^f, \beta^f, \theta\right) = & \left[q_\theta\left(x^p, \beta_\theta^p\right) - q_\theta\left(x^p, \beta_\theta^f\right)\right] \\ & + \left[q_\theta\left(x^p, \beta_\theta^f\right) - q_\theta\left(x^f, \beta_\theta^f\right)\right] \\ & + residual \end{aligned}$$

where p denotes part-time and f fulltime.

As shown in the last equation, at each quantile, the difference of the unconditional distributions can be divided into two components. The first component represents the difference in labour market characteristics of the two groups – the *characteristics'* effect, while the second component represents the differences between the rewards that the two groups obtain from their labour market characteristics – the *coefficients'* effect. Thus, the second component is the unexplained part of the part-time wage-gap for the specific quantile. The underlying assumption of this model is that the residual term disappears if the linear regression model is accurately specified and if we use a sufficiently-high number of simulations (Melly, 2005).

In the aforementioned decomposition, any omitted variable or error in the measurement become part of the coefficients' effect and increase the unexplained part of the part-time wage gap. This is a well-known problem of the Oaxaca-Blinder decomposition. However, this is less of a problem for the quintile counterfactual decomposition. The reason for this is that the quintile regression estimates the returns for the characteristics within each quantile separately, which improves the precision in the estimation of explained and unexplained component of the wage-gap (Gregory, 2010).

5. Results

5.1. The effect of part-time work across the wage distribution

As shown in table 1, the average hourly wage of a part-time worker in our sample is 11.2 Euros while the full-time equivalent is 13.0 Euros. To get a smooth representation of the distributions of the hourly wage of part-time and full-time workers, kernel density estimates are plotted in figure 1. This graph illustrates that the wage distribution of full-timers is highly concentrated around the mode. In contrast, part-timers have a somewhat higher dispersion of their density function.

[Insert Figure 1 here]

The results of the pooled OLS and the quantile regressions using several specifications of the model are presented in table 2. According to the primary model-specification (regression 1), the OLS regression shows that part-time workers receive on average a 7.8% lower wage than their full-time colleagues. This concurs with the findings of Fouarge and Muffels (2009), who suggest that the part-time wage-gap in Germany is smaller than in other countries. However, the picture becomes different if we investigate the part-time wage-gap in the various part of the wage distribution.

[Insert Table 2 here]

Figure 2 gives a graphical illustration of the estimates of regression 1 for the part-time wage gap that are presented in Table 2. The estimated wage-gap is presented together with the 95% confidence interval. Figure 2 shows that, controlling for other covariates, a decreasing wage-gap between part-timers and full-timers emerges when we move from the lowest to the highest conditional income quantiles. Actually, the wage penalty reverses into a small wage premium when we reach the top decile. In more detail, at the bottom of the distribution (10^{th} percentile), the wage-gap is around 15.2% to the disadvantage of part-time workers. The wage-gap presents the following trend as we move to higher deciles: -11.1% in the 20^{th} percentile, -8.5% in the 30^{th}, -6.3% in the 40^{th}, -4.7% in the median, -3.5% in the 60^{th} and -2.1% in the 70^{th} percentile. These results are in line with the 1^{st} hypothesis: there is a significant part-time wage penalty that varies considerably across the wage distribution after controlling for socio-economic and employment-related characteristics. In accordance with hypothesis 2a, the wage-gap disappears for part-timers at the higher wage quantiles: the wage-difference between full-timers and part-timers becomes not existent in the 80^{th} percentile and increases to 3.2% to the benefit of the part-time workers in the 90^{th} percentile).[3]

[3] We tested the sensitivity of our approach with the aforementioned variables and also by using an alternative to the 'job search' variable suggested by Bosio (2009) – 'ability to start a new job' – in a model proposed by Frölich and Melly (2008)) for unconditional quantile treatment effects. Our instrumental variable strategy shows higher returns to part-time employment, especially at the lower end of the wage distribution. The size of these returns fluctuates across the distribution. However, we have to concur with the findings of Manning and Petrongolo (2008) that the bias that is introduced to the models by the strong assumption of instrumental variables – assuming that variables such as children and marital status are related to part-time but not to the dependent variable – does not adequately correct for the problem. In fact, they may be no better than the assumption of exogeneity that intervening variables are supposed to replace. We carried out additional sensitivity checks for our instrumental

[Insert Figure 2 here]

All in all, the results from the quantile regressions seem to favour more the segmentation theory than theory on the quasi-fixed costs. At the lower end of the wage distribution, part-time jobs may be characterised as 'bad' jobs or jobs belonging to the secondary labour market where skills' accumulation is not rewarded (hypothesis 2a). The extent of the part-time wage-gap at the bottom of the distribution hints to the fact that in the highly segmented German labour market, low-wage part-time workers are more easily marginalised and are typical 'outsiders'. In contrast, in high-wage jobs, working part-time is not associated with a wage penalty, suggesting that in the primary segment of the labour market part-time jobs are not 'bad jobs'.

We should stress here that contrary to previous studies that focussed on mean effects of part-time employment (Bardasi & Gornick, 2008; Manning & Petrongolo, 2008), the estimated part-time wage-gap is not sensitive to occupational differences. Our models were also estimated without occupation as a covariate and no drastic change of the part-time wage-gap emerged.[4] Our results show also little sensitivity to the pooling over the years. We repeated the analysis for several separate cross-sections and the main results persisted. Specifically at the bottom of the distribution the effects of characteristics contribute more to the gap, while the characteristics of part-timers improve going towards the top of the wage distribution. Results are available on request.[5]

Regressions 2-4 in table 3 perform the same analysis using different specifications. In regression 2, the sample is restricted only to women. The reason is that part-time jobs are largely concentrated among women, as women use this form of employment to achieve their optimal work-life balance. The quantile regression for women shows that the main results of our analysis at the lower end of the wage distribution persist when we restrict our sample to female workers. A wage-gap emerges at the lower quantiles that reduces as we move to the top quantiles. This wage-gap disappears already at the 30th quantile and turns into a small wage premium at the highest quantiles (3.3% in 90th quantile).

[Insert Table 3 here]

Regression 3 distinguishes between voluntary and involuntary part-time jobs. In this way, we can get a more robust test of the predictions of segmentation theory for the role of part-time jobs. We define part-time employment as involuntary when the desired working hours of the respondent are higher than the actual working hours at the time of the survey. The results of regression 2 shows that, with the exception of the top quintiles, the effect of part-time work on the wage differs considerable between voluntary and involuntary part-time. Voluntary part-time work has no effect on the wage at the lowest 2 quintiles. However, as from the 3rd quintile, a part-time wage premium of 2.4% emerges that increases to 4.6% as we move towards the highest quintile. In contrast, when involuntary part-time work is associated with a wage penalty of 8.5% at the lowest quintile. This wage penalty decreases as we move

variable (e.g. correlation from 2SLS; analysis of standard errors) that are regularly ignored in other studies. These showed that the instrument is indeed not strong. Results of these analyses and tests are available on request.

[4] These estimation results are available on request.

[5] As the number of cases was considerably lower in these year-specific models, we run into issues concerning the lack of power. Therefore, we had to remove some of the predictors. The small divergence of the results of the yearly models with the main analysis may be attributed to the removal of these predictors.

higher up the wage distribution (3.8% at the 3rd quintile, 1.2% at the median) and turns into a premium at the upper 2 quintiles (1.9% at the 8th and 3.9% at the 9th quintile).

Regression 4 presents the results from a quantile regression on the full sample where part-time employment is interacted with a variable indicating whether the respondent has changed an employer in the year prior to the survey. The results indicate that part-time work has a very different effect for workers staying at the same job and workers changing a job. For workers staying at the same job, a wage premium emerges at all quintiles with the exception of the 1st. At the second quintile the wage premium amounts 5.9%. From then on, it increases fast as we move towards the highest quintiles. At the top quintile it even reaches 48% (!). A very different picture emerges for workers that changed job in the year prior to the survey. At the lowest quintile, there is a wage penalty of 1.7% for part-timers. This penalty increases to 7% at the 4th quintile and decreases thereafter. At the top 2 quintiles, it turns into a wage premium for part-timers. Specifically, at the top quintile, part-timers earn on average 5.5% more than full-timers.

All in all the results of regressions 3 and 4 indicate that the negative effect of part-time work that is found in regressions 1 and 2 is driven by involuntary part-time employment and by job switchers. This gives some additional credence to hypothesis 2a from the dual labour market theory meaning that in the lower end of the wage distribution concentrates so called 'bad jobs' for part-time employment.

Counterfactual wage decomposition

To further quantify and understand the wage-gap between part-time and full-time workers, a counterfactual wage decomposition on the main specification of the model (regression 1 in table 3) is performed. The results of this decomposition are presented in table 4. The first column of this table presents the average ('raw') wage gap before controlling for other characteristics in every quintile. The second and the third column present the two effects that are estimated per quintile by the counterfactual wage decomposition: the characteristics' effect and the coefficients' effect. Table 4 indicates that not only the size of the part-time wage, but also its source differs across the various parts of the wage distribution. More specifically, at the very bottom of the distribution (10th percentile), the 'raw' wage-penalty for part-time employment amounts to 21.5%. This large wage-gap is the result of a large characteristics' effect (-8.0%) and an even larger diverging coefficients' effect (-13.5%). As we move to higher deciles of the wage distribution, the characteristics' effect becomes gradually more important (-8.0% to -15.0% from the 20th to 90th percentile of the wage distribution) and reinforces the wage gap in favour of the full-timers. In contrast, the coefficients' effect, which indicates the possible existence of discrimination against the part-timers, becomes steadily smaller as we move from the bottom to the top of the distribution (-11.1% to -3.1% from the 20th to 80th percentile of the wage distribution). Essentially, at the top quintile, the wage difference derived from the returns to labour-market characteristics is non-existent.

[Insert Table 4 here]

All in all, the wage decomposition shows that the different composition of part-timers and full-timers can explain a large part of the part-time wage gap in many

parts of the wage distribution. In fact, at the top deciles, this different composition can almost fully explain the wage gap. In contrast, the 'residual' wage gap that cannot be explained by the different composition of the two groups is mostly important at the bottom of the distribution and non-existent at the top of the distribution.

A comment on the different direction and size of the two components at the various parts of the wage distribution is necessary. It seems that workers with characteristics that produce high wage returns are overrepresented among part-timers at the bottom of the distribution. This points to the role of individual preferences in labour-market participation. Several individuals with high-earnings potential value the possibility to work part-time more than earnings. However, these individuals pay a price for their choice as their characteristics are not equally remunerated compared to their full-time colleagues. The lower remuneration of characteristics reduces to almost zero as we move to the top deciles. Considering that a broad range of characteristics is included in the decomposition, this reinforces the conclusion that a part-time job is a 'bad' job at the bottom of the distribution but not at the top of the distribution.

5.2. Sensitivity check: an analysis with a fixed-effects estimator

As a first sensitivity check, we apply Canay's two step estimator using the same set of predictors as our primary analysis to show the effect of part-time relative to the persons own fixed effects. The first step of the analysis – the fixed effects wage regression – shows that after the total disturbance has been removed the effect of part time work on the wage is no longer negative but positive.[6] This indicates that the average part-time wage gap is explained away (and actually turns into a part-time wage premium) when we control for time-constant unobserved individual characteristics.

[Insert Table 5 here]

Table 5 presents the results of the decomposition analysis based on the quintile regression of the second step of Canay's estimation. This table shows that there is a substantial wage premium in the bottom of the wage distribution for part-timers compared to full-timers relative to the persons own fixed effects coming from the better socio-economic characteristics of part-timers. More specifically, at the very bottom of the distribution (10^{th} percentile), the 'raw' wage-premium for part-time employment amounts to 16.3% and at the 20^{th} percentile 18.5%. The premium diminishes as we move towards the top of the wage distribution to 4.6% at the 90^{th} percentile. Focussing on the effect of characteristics comparative to the persons own fixed effects, at the very bottom of the wage distribution, part-time workers have considerably better socio-economic and labour market characteristics – compared to full-time workers. From the 50^{th} percentile onward the coefficients effect is responsible for the largest part of the wage premium relative to the persons own fixed effects. From the 50^{th} percentile onward part-timers have worse labour market characteristics lessening the wage premium with 1.2% (50^{th} percentile) up to 3.2% (90^{th} percentile). As from the 50^{th} percentile, the wage gap can be almost completely attributed to the coefficients' effect comparative to person's own fixed effects. The coefficients' effect grows steadily as we move from the bottom to the top of the distribution. The unexplained part of the wage premium is 8.4% in the top wage

[6] The results of this regression are available on request.

percentile, while part of the raw wage gap is diminished for part-timers due to worse labour market characteristics within the top quantile of part-timers (positive characteristic's effect of 3.7%).

6. Conclusions

This paper investigated the part-time wage gap in Germany by using the wage level as a proxy that captures a large part of the heterogeneity in part-time employment. By employing a quantile regression, we found that the part-time wage-gap is larger in the lower part than in the higher part of the wage distribution. However, our analysis showed also that the wage gap is largely due to involuntary part-time work and to job movers. When part-time is voluntary and tenure is longer, part-timers enjoy a wage premium. The counterfactual wage decomposition revealed that the source of the wage-gap differs also significantly between the bottom and the top of the wage distribution. At the bottom of the distribution, the part of the wage-gap is due to differences in the returns of the socio-economic and job characteristics between part-time and full-time workers is dominant. In contrast, at the top of the distribution, the part time wage-gap is almost entirely produced by differences in the observed characteristics between part-timers and full-timers. Additional analysis adds some nuisance to our findings. When we corrected for unobserved heterogeneity with the Canay's fixed effects quantile regression, the wage penalty turned to a wage premium, while the decomposition analysis showed a more complicated picture. However, the primary assumption of the Canay's method – the fact that unobserved heterogeneity has the same effect at all quintiles – is so strong and questionable that these results cannot be considered entirely robust.

This study confirms the heterogeneous nature of part-time employment. Employers offer part-time jobs to adjust to non-standard needs of output. However, their decision to 'penalize' part-timers with a lower wage depends on various factors. If the complexity and the structure of the job increase, the cost of using part-time employment increases accordingly. Sometimes, it may be just the perception of the employer about the job that matters. In a labour market where long-term standard employment relationships are valued, part-time contracts are offered for low-paid jobs that are less important for employers. For all these reasons, involuntary part-timers may receive a lower wage than their full-time colleagues.

Workers accept part-time jobs according to their needs but also according to their preferences in order to achieve their optimal work-life balance and combine employment with other activities. Sometimes, these workers are able to find part-time jobs that offer a higher hourly wage than full-time jobs. However, these workers may sometimes accept a lower hourly wage provided that they can maintain their optimal number of working hours.

Finally, demand for part-time work cannot always be considered exogenous. The increased willingness of workers to work part-time may induce firms to increase their demand for part-time employment as they think that, in this way, they will attract applicants with better skills.

Labour market regulation does not leave these processes unaffected. When the wage setting is regulated by law or collective bargaining, penalizing the part-timers with a lower wage is difficult. In a labour market where no statutory minimum wages

exist and collective bargaining does not cover all firms, the heterogeneity that is produced by regulation is even larger.

Our results indicate that ignoring the differences between the various parts of the wage distribution and focussing on average effects that has been the dominant approach in the literature, conceals the very different function of part-time employment at the various strata of the wage distribution. Actually, explanations based on job quality seem to matter more in the determination of the part-time wage gap than the costs related to the use of part-time work. In theoretical terms, this means that we should derive explanations for the part-time wage gap from labour market segmentation theory and less from economic theory on quasi-fixed costs.

Understanding the causes of the part-time wage-gap is also necessary to calibrate labour market policies that introduce more flexibility. Our results indicate that part-time employment is strongly related to the segmented nature of the German labour market. At the bottom of the distribution, part-time is considered as an inherent characteristic of a bad job, while at the top of the distribution part-time jobs are more likely to be good jobs. However, except for labour market segmentation, individual preferences for work-life balance play an important role. More specifically, some individuals with high earnings potential seem to value other activities more than employment and they accept working in low-paid part-time jobs where they face a wage penalty compared to their full-time colleagues.

From a policy perspective, the aforementioned findings suggest that Germany has to concentrate more on the risk groups and especially on the low-wage involuntary part-timers. Thus, recent reforms in the German labour market towards flexibility and encouraging part-time work (that in effect may result in low-skilled work) could subsidise the locking into low-wage employment (see on this topic e.g. Kyrrä , Parrotta, & Rosholm, 2009; Van Ours, 2004). This could be an area in which regulation for labour protection could have an effect.

This analysis should be refined with development of non-additive, fixed effects quantile regression that will allow the further identification of the causal effects of part-time employment across the wage distribution.

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Table 1. Descriptive statistics

Variables	Categories	Full-time	Part-time	Total
		Mean (Std) or %		
Real gross hourly wage	Cont. variable (Euros)	12.988 (6.321)	11.152 (5.925)	
Age	Cont. variable (years)	39.686 (9.341)	41.301 (8.439)	
Nr of kids	Cont. variable	0.575 (0.883)	0.842 (0.927)	
Actual hours worked	Cont. variable	43.019 (6.141)	20.864 (7.171)	
Tenure	Cont. variable (years)	10.279 (8.952)	8.244 (8.026)	
Sex	Man (woman reference category)	62.96%	7.71%	52.68%
Married	Yes (no reference category)	61.28%	76.60%	64.13%
Age of the youngest child	No children (reference category)	63.43%	46.14%	60.22%
	Preschool(0-6)	12.34%	15.21%	12.88%
	Pre-teens(7-12)	13.48%	22.36%	15.14%
	Teenagers (13-16)	10.74%	16.29%	11.77%
Education *(based on ISCED codes: 6 (high), 3–5 (medium), and 1–2 (low))*	Low education	12.15%	14.38%	12.57%
	Medium education	63.27%	64.29%	63.46%
	High education (ref. category)	24.58%	21.33%	23.97%
Severely handicapped	Yes (no reference category)	4.76%	4.31%	4.68%
Nationality	Non-German (German reference category)	11.86%	8.51%	11.24%
Region	East-Germany (West-Germany reference category)	30.01%	18.81%	27.93%
Temporary contract	Yes (permanent contract reference category)	7.48%	11.39%	8.21%
Received training prev. year	Yes (no reference category)	2.48%	0.95%	2.19%
Unemployment experience (prev. year)	Yes (no reference category)	5.13%	6.22%	5.33%
Firm-size (nr of employees)	Micro firm (<20)	4.74%	12.79%	6.24%
	Small firm (20-199)	44.50%	50.58%	45.63%
	Medium firm (200-1999)	25.16%	17.44%	23.72%
	Large company (=>2000) (reference category)	25.60%	19.19%	24.41%
Sector *(based on NACE categorization)*	Manufacturing (reference category)	23.98%	9.05%	21.20%
	Energy	1.30%	0.36%	1.13%
	Mining	0.48%	0.09%	0.41%
	Agriculture	1.21%	0.67%	1.11%
	Construction	15.88%	3.88%	13.65%

	Trade	11.85%	21.84%	13.71%
	Transport	5.97%	3.34%	5.48%
	Banking, insurance	4.57%	3.62%	4.39%
	Other services	34.76%	57.15%	38.92%
Occupation *(based on the highest categories of the ISCO-88 4-digit occupational categorization)*	Legislators, senior officials and managers (reference category)	5.39%	1.00%	4.57%
	Professionals	17.05%	12.93%	16.29%
	Technicians and associate professionals	22.66%	28.06%	23.66%
	Clerks	11.21%	19.15%	12.69%
	Service, sales workers	7.78%	20.94%	10.22%
	Skilled agricultural workers	0.79%	0.51%	0.73%
	Craft and trade workers	19.09%	2.62%	16.03%
	Plant and machine operators	10.42%	1.99%	8.86%
	Elementary occupations	5.60%	12.80%	6.94%
Number of observations (N)		84,836	19,397	104,233

Source: Authors, GSOEP sample of 1991-2012.

Table 2. Selection of estimates for OLS and quantile regressions (10^{th}- 90^{th} quantile (standard errors in parenthesis)) from the main model specification

	OLS	Q.10	Q.20	Q.30	Q.40	Q.50	Q.60	Q.70	Q.80	Q.90
Part-time (full-time ref.)	-0.059***	-0.184***	-0.129***	-0.093***	-0.068***	-0.049***	-0.030***	-0.018***	-0.003	0.033***
	(0.010)	(0.010)	(0.006)	(0.005)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.006)
Man (woman ref.)	0.159***	0.148***	0.139***	0.135***	0.141***	0.144***	0.147***	0.152***	0.158***	0.174***
	(0.005)	(0.007)	(0.007)	(0.006)	(0.005)	(0.007)	(0.004)	(0.005)	(0.006)	(0.003)
Medium education (low education ref.)	0.059***	0.086***	0.074***	0.063***	0.057***	0.051***	0.049***	0.047***	0.047***	0.052***
	(0.006)	(0.012)	(0.008)	(0.007)	(0.007)	(0.004)	(0.003)	(0.003)	(0.002)	(0.001)
High education (low education ref.)	0.169***	0.180***	0.168***	0.159***	0.155***	0.150***	0.149***	0.152***	0.161***	0.183***
	(0.008)	(0.008)	(0.003)	(0.003)	(0.005)	(0.003)	(0.004)	(0.006)	(0.005)	(0.002)
Temp. contract (permanent ref.)	-0.115***	-0.202***	-0.134***	-0.117***	-0.104***	-0.096***	-0.086***	-0.086***	-0.078***	-0.074***
	(0.006)	(0.007)	(0.003)	(0.009)	(0.002)	(0.006)	(0.009)	(0.006)	(0.003)	(0.001)
Region (W-G. ref.)	-0.209***	-0.262***	-0.252***	-0.239***	-0.228***	-0.216***	-0.206***	-0.194***	-0.184***	-0.174***
	(0.005)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)	(0.002)	(0.001)
Energy (manufacturing ref.)	0.084***	0.162***	0.147***	0.117***	0.095***	0.076***	0.061***	0.044***	0.013	-0.005
	(0.013)	(0.003)	(0.006)	(0.007)	(0.008)	(0.016)	(0.006)	(0.003)	(0.008)	(0.033)
Mining (manufacturing ref.)	-0.003	-0.011	-0.012	-0.030***	-0.023	-0.038***	-0.033***	-0.040***	-0.041***	-0.037***
	(0.026)	(0.064)	(0.026)	(0.005)	(0.014)	(0.001)	(0.003)	(0.011)	(0.007)	(0.005)
Agriculture (manufacturing ref.)	-0.237***	-0.264***	-0.251***	-0.241***	-0.250***	-0.261***	-0.243***	-0.246***	-0.247***	-0.224***
	(0.020)	(0.017)	(0.008)	(0.027)	(0.027)	(0.022)	(0.019)	(0.029)	(0.032)	(0.018)
Construction (manufacturing ref.)	0.018***	0.039***	0.034***	0.029***	0.027***	0.019***	0.012***	0.003***	-0.005***	-0.013**
	(0.006)	(0.001)	(0.002)	(0.002)	(0.005)	(0.005)	(0.003)	(0.000)	(0.002)	(0.006)
Trade (manufacturing ref.)	-0.144***	-0.162***	-0.148***	-0.147***	-0.144***	-0.149***	-0.150***	-0.147***	-0.144***	-0.145***
	(0.007)	(0.001)	(0.003)	(0.006)	(0.006)	(0.006)	(0.005)	(0.002)	(0.002)	(0.005)
Transport (manufacturing ref.)	-0.079***	-0.126***	-0.096***	-0.088***	-0.088***	-0.087***	-0.085***	-0.079***	-0.078***	-0.073***
	(0.010)	(0.000)	(0.003)	(0.007)	(0.004)	(0.007)	(0.006)	(0.008)	(0.002)	(0.000)
Bank. insurance (manufacturing ref.)	0.112***	0.117***	0.120***	0.112***	0.105***	0.098***	0.100***	0.100***	0.101***	0.117***
	(0.011)	(0.009)	(0.007)	(0.001)	(0.002)	(0.001)	(0.009)	(0.011)	(0.010)	(0.011)
Other services (manufacturing ref.)	-0.047***	-0.045***	-0.037***	-0.039***	-0.044***	-0.050***	-0.053***	-0.060***	-0.065***	-0.071***
	(0.006)	(0.003)	(0.003)	(0.006)	(0.007)	(0.009)	(0.004)	(0.003)	(0.001)	(0.001)
Constant	1.101***	0.913***	1.085***	1.222***	1.328***	1.417***	1.496***	1.609***	1.665***	1.844***
	(0.033)	(0.004)	(0.013)	(0.029)	(0.017)	(0.020)	(0.018)	(0.012)	(0.011)	(0.027)
R^2 (OLS)/Pseudo R^2 (QR)	0.661	0.459	0.469	0.423	0.433	0.399	0.371	0.358	0.364	0.344

* p<0.05, ** p<0.01,*** p<0.001

Additional control variables in the model were age, marital status, nationality, health status, the age of the youngest dependent child, firm size, occupation, unemployment experience and training and control for business cycles.

Table 3. Selected results from OLS and quintile regressions using several model specifications

	OLS	Q.10	Q.20	Q.30	Q.40	Q.50	Q.60	Q.70	Q.80	Q.90
Regression 1. (full sample)										
	-0.059	-0.184***	-0.129***	-0.093***	-0.068***	-0.049***	-0.030***	-0.018***	-0.003	0.033***
Regression 2. (women-only sample)										
Part-time (full-time ref.)	0.009	-0.047	-0.023	-0.008	-0.002	-0.007	-0.012	-0.019	0.027	0.039
Regression 3. (full sample)										
Distinguishing between voluntary and involuntary part-time work										
Voluntary part-time (full-time ref.)	0.031	-0.008	-0.01	0.024	0.032	0.032	0.032	0.040	0.040	0.045
Involuntary part-time work (full-time ref.)	-0.008	-0.083	-0.058	-0.037	-0.024	-0.012	-0.007	0.006	0.019	0.038
Regression 4. (full sample)										
Job change added to the full sample + interaction with part-time quantile regression										
Part-time (full-time ref.)	0.173	0.008	0.057	0.080	0.090	0.108	0.132	0.172	0.215	0.393
Job change new employer (no change ref.)	0.234	0.140	0.015	0.190	0.211	0.059	0.257	0.259	0.258	0.264
Part-time x job change	-0.22	-0.194	-0.185	-0.147	-0.163	-0.154	-0.16	-0.172	-0.198	-0.339

* p<0.05. ** p<0.01.*** p<0.001

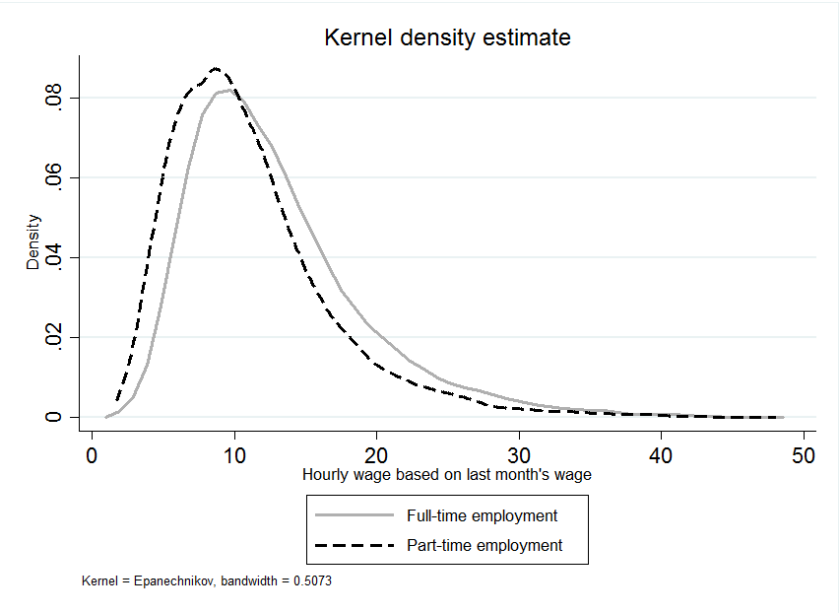
Table 4. Decomposition of part-time wage-gap based on the conditional model

	Raw wage-gap (Std.)	Characteristics effect (Std.)	Coefficients effect (Sdt.)
Q.10	0.215	0.080	0.135
	(0.001)	(0.001)	(0.009)
Q.20	0.191	0.080	0.111
	(0.004)	(0.000)	(0.006)
Q.30	0.176	0.085	0.092
	(0.005)	(0.000)	(0.005)
Q.40	0.167	0.091	0.077
	(0.005)	(0.000)	(0.005)
Q.50	0.162	0.097	0.065
	(0.005)	(0.001)	(0.004)
Q.60	0.160	0.106	0.054
	(0.006)	(0.001)	(0.004)
Q.70	0.160	0.116	0.044
	(0.007)	(0.001)	(0.004)
Q.80	0.159	0.129	0.031
	(0.009)	(0.001)	(0.004)
Q.90	0.151	0.150	0.001
	(0.010)	(0.002)	(0.006)
No. of obs. in the reference group 84835 No. of obs. in the counterfactual group 19399			

Table 5. Decomposition of part-time wage differentials based on the Canay's fixed effects model

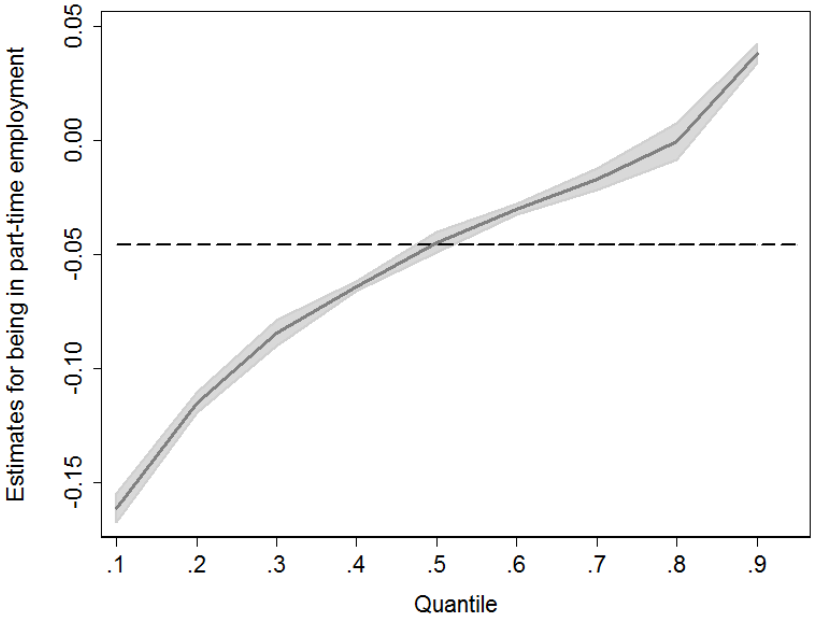
	Raw wage-gap (Std.)	Characteristics effect (Std.)	Coefficients effect (Sdt.)
Q.10	-0.163	-0.126	-0.037
	(0.008)	(0.008)	(0.005)
Q.20	-0.185	-0.132	-0.053
	(0.007)	(0.006)	(0.003)
Q.30	-0.167	-0.108	-0.059
	(0.006)	(0.005)	(0.003)
Q.40	-0.134	-0.073	-0.061
	(0.005)	(0.004)	(0.002)
Q.50	-0.099	-0.037	-0.062
	(0.004)	(0.004)	(0.002)
Q.60	-0.073	-0.009	-0.064
	(0.004)	(0.004)	(0.002)
Q.70	-0.057	0.011	-0.067
	(0.004)	(0.004)	(0.002)
Q.80	-0.047	0.026	-0.073
	(0.004)	(0.004)	(0.002)
Q.90	-0.046	0.037	-0.084
	(0.004)	(0.003)	(0.003)
No. of obs. in the reference group 84835			
No. of obs. in the counterfactual group 19399			

Figure 1. Kernel density function estimates for the real gross hourly wage of part-time and full-time workers



Source: Own calculation from GSOEP sample of 1991-2012.

Figure 2. Asymptotic 95% Confidence Interval of quantile regression estimates for part-time employment (controlled for other covariates)*



*The dashed line depicts the OLS estimate.
Source: own calculations from GSOEP sample of 1991-2012.